

Docket # 70418

## **THREE-SIDE TRIMMER, ESPECIALLY FOR SHORT RUNS**

### **FIELD OF THE INVENTION**

The invention relates to three-side trimming, which is an essential process step in producing blocks for hardback books and in producing brochures.

### **BACKGROUND OF THE INVENTION**

5        The three-side trimming is usually carried out in a station by the block pressed between a cutting table and a pressing plate being trimmed first at the head and the foot and then on the front. The sequence may also be reversed. The knives cut by a pinching cut against a plastic strip. The knife penetrates minimally the cutting strip during the cutting. To reduce the cutting

forces at the beginning of the cutting and the cutting forces in general, the movement of the knives generates an oblique swing cut, and the movement component on the side along the knife edge is approximately equal to the normal cutting movement. At the beginning of the cutting of the block, the knife edge is at first not parallel to the cutting table, as a result of which the cut begins at a corner of the block and the cutting force increases from a low value to the maximum.

Three-side trimmers, also called trimmers, are also used in which the head and foot cut and the front cut are performed in separate stations. This type is used mainly in the case of large numbers of cutting cycles but small product thickness. The division into two stations makes possible the high cut counts.

The cutting is usually performed according to the shears principle by a knife against a counterknife. The blocks are held only by pressing strips directly next to the cutting plane for fixation during cutting.

The three-side trimmers of the type mentioned first, which cut in one station, make possible cutting of high quality in case of a solid, heavy design of the components. However, the drawback is, besides the heavy design of the components, that the pressing plate and the cutting table must be accurately coordinated format parts. The cutting table is a replaceable part with very small format jumps. The pressing plate must be accurately adapted to the finished, cut format for each product. Moreover, roundings and bevels also frequently have to be arranged in the production of brochures to prevent creases in the back and of print marks on the pressing plate from being formed. This is especially uneconomical, particularly for

short runs, where the set-up time plays an especially great role.

The usual, commercially available two-station three-side trimmers are not suitable for the production of products of high quality.

Aside from the limitation of the cutting thickness, the pressing strips produce marks, especially on the back in brochures. Because of the absence of full-area pressing, there are deviations in cut. These trimmers advantageously have no format parts.

## SUMMARY OF THE INVENTION

The present invention combines the advantages of the two systems and eliminates drawbacks by special features.

The three-sided trimming is carried out according to the present invention in two stations in order to eliminate the problem of replaceable parts for short runs. The head-and-foot cut and the front cut are performed in units of nearly identical design, and the cutting units for the head and foot in the head-and-foot station are adjustable in relation to one another according to the height of the format.

The knives cut by the usual oblique swing cut against cutting strips, which are replaceably fastened on stable table strips. As a result, great product thicknesses can be cut with a high quality of cut.

The pressing is performed by pressing strips directly next to the cut against the table strips.

To avoid deviations in cut, both the pressing strips of the head and foot and the table

strips of the head and foot are connected to one another by telescoping adapters, so that the block is held down over the full area during cutting.

Due to a slightly oblique position and elasticity, the upper adapters ensure that the air is pressed out of the block from the back during pressing.

5 A full-area cutting table is present in the front cutting station, and the pressing strip is expanded by a holding-down clamp, which also presses the air away from the back due to an oblique position and an elastic surface.

All quality requirements are thus satisfied without the use of replaceable parts. Short set-up times are associated with high quality of cutting.

10 The cutting units are designed as elements that are closed in themselves.  
All pressing and cutting forces remain within the compact units.

The knives are guided with precision over a large surface. Deformations due to the cutting forces are prevented from occurring and optimal quality of cut is in turn achieved as a result. In addition, knife breakage is prevented from occurring.

15 The support frame for the cutting units can have a relatively lightweight design, which leads to a considerable weight reduction compared with a commercially available three-side trimmer.

To optimize handling during the knife change, the front cutting unit can be displaced in order to have good access to the front knife.

20 The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better

understanding of the invention, its operating advantages and specific objects attained by its uses, reference is made to the accompanying drawings and descriptive matter in which a preferred embodiment of the invention is illustrated.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

Figure 1 is an overall perspective view of the three-side trimmer;

Figure 2 is a longitudinal sectional view; and

Figure 3 is the view of the head and the foot stations in the block conveying direction.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in particular, the cutting units for head 1 and foot 2 can be adjusted to format by the stroke y in the guides 3 on the support frame 4 with the feet 4a. An adjusting spindle 5 is used for this purpose. The cutting unit for front 6 can be displaced by the stroke h in the rails 7 on the support frame 4 to provide access to the front knife during the knife change. The cutting units 1, 2 and 6 are of identical design. The knife holders 9 with the knives 10 are guided in a frame 8. The movement takes place by means of the coupling rods 11 and the cranks 12. The obliquely extending swing cutting movement is generated by the guide roller 13, which is guided in an oblique groove in the knife holder 9. The knives cut against the cutting strips 14.

The cutting strips 14 are held in the head and foot stations 1, 2 by the strips 15, which

are fastened directly to the frame 8. The cutting strips 14 are arranged in the front station at a full-format cutting table 16, which is likewise fastened directly to the frame 8.

In the head-and-foot station, the strips 15 are extended by telescoping adapters 17 to the passage area of the conveyor 18 in order to achieve a flat contact of the material to be cut, avoiding the use of format parts. Figure 3 shows a possible shutter-like design of the adapters 17. Another possibility is the design similar to an accordion.

During cutting, the material being cut in the head-and-foot station is pressed by the pressing strips 19, which are moved by means of toothed rack drives 20. The pressing strips are extended to the center of the machine by telescopic adapters 21. They may be, e.g., in the form of a shutter. They are arranged slightly obliquely, so that they touch the block first on the back in order to press out the air for the cutting, after which they easily conform elastically to the shape. For example, the elements of the shutter are coated with a foam for this purpose.

In the front cutting station, the pressing is performed by the plate 22, which in turn is moved by the toothed rack drive 20. Near the knife, in the pressing area proper, the plate 22 has a fixed support 22a and behind it an elastic support 22b, which is designed such that the back of the block comes into contact with it first.

The three cutting units have separate drives for moving the respective knives and pressing. The material to be cut is conveyed by the conveyors 18 and 18a moving to and fro as well as up and down by the strokes h1 and h2. During conveying into the head-and-foot station, the back of the block always reaches the same position regardless of the format. The pressing strips 19 have recesses in this area in order to prevent creases from being formed on

the back during the trimming of brochures. In the intake, the blocks are aligned in advance by the conveyor 18 and the stop plates 23 and are aligned once again in the first cutting position by the stops 24. During the conveying by the conveyor 18a into the front cutting station, the block is brought over the bridge 25 up to and against the back stop 26. After the cutting has been performed, the block is then brought onto a discharge belt 27 in a manner that is not shown, e.g., by a chain conveyor running around the cutting table 16.

The trimmings drop into an exhaust channel 28. It is also possible to draw off the wastes of the two stations separately because of the glue present in the head-and-foot station.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.